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(54) **FAILSAFE REMOTE DATA CONCENTRATOR**

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See application file for complete search history.

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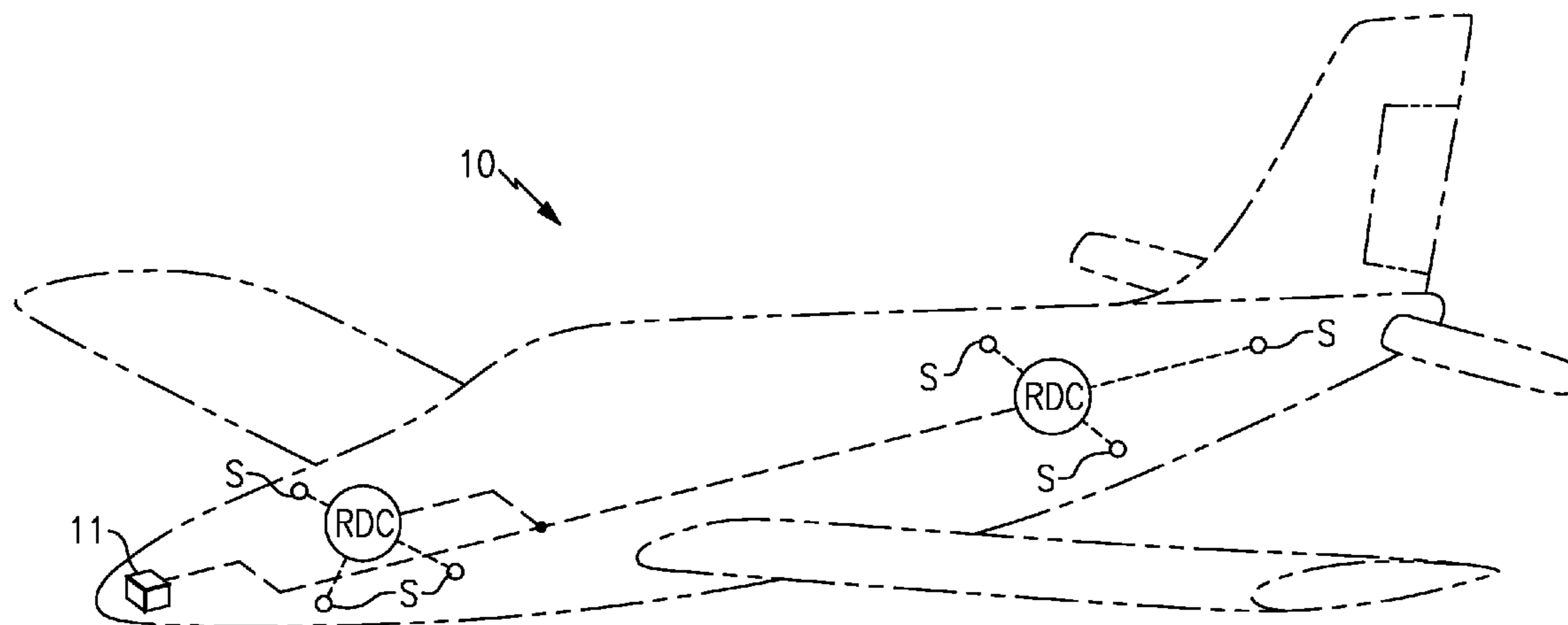
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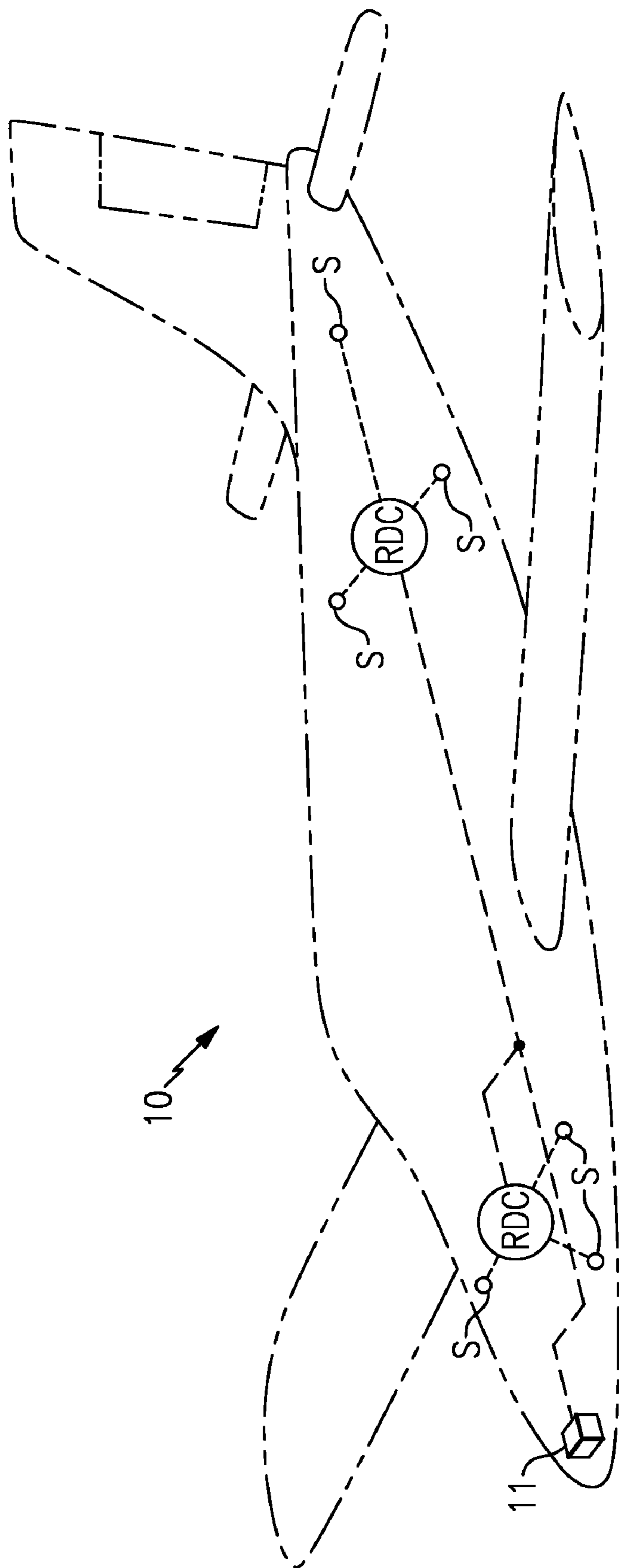
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(57) **ABSTRACT**

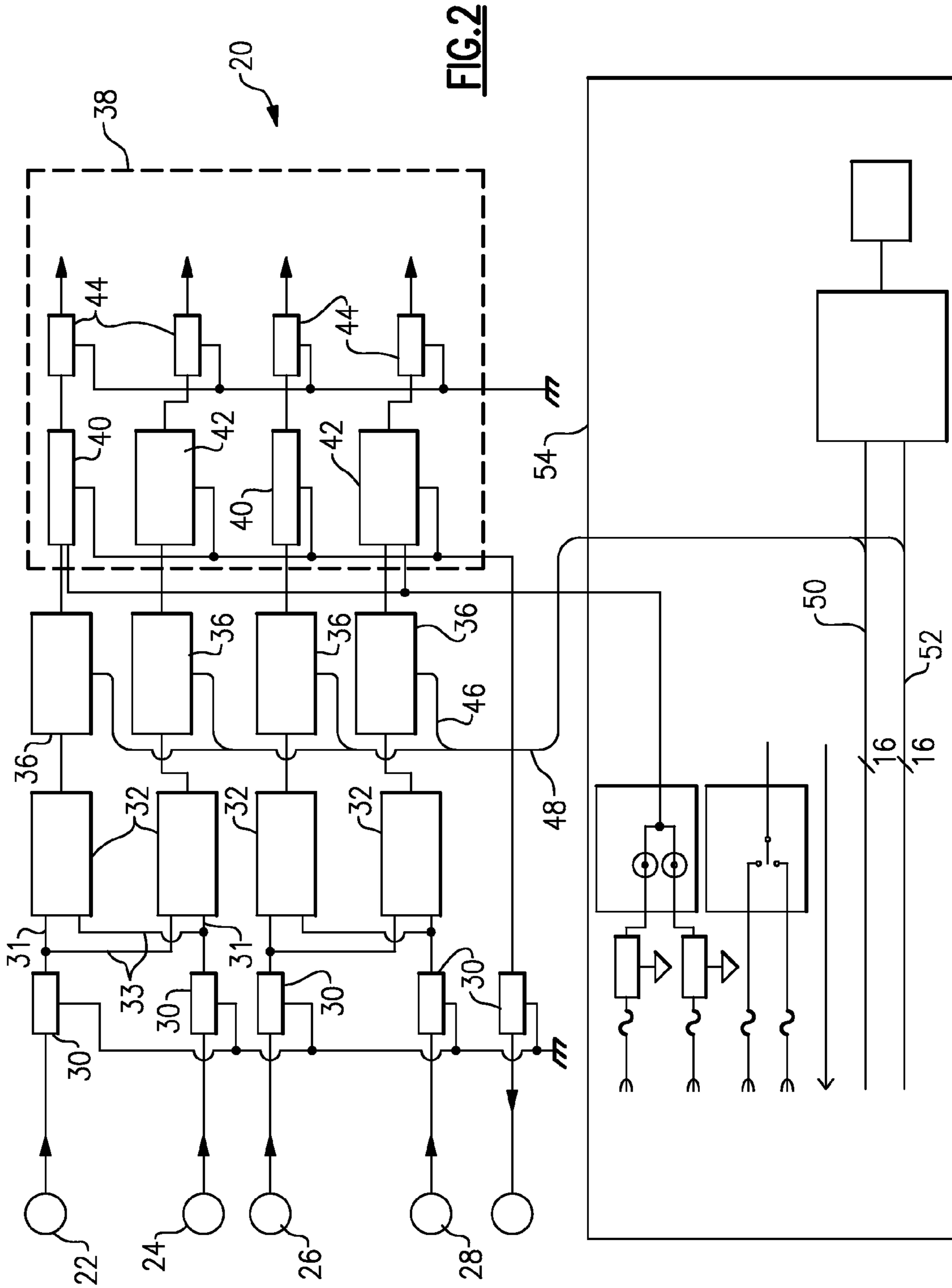
A remote data concentrator receives signals from a plurality of sensors. The plurality of sensors are for use on an aircraft. Each of the sensors have their signals split between at least two flow paths, such that each of the sensors are provided with redundancy. The remote data concentrator is also utilized as part of an aircraft electrical control system.

**9 Claims, 2 Drawing Sheets**





**FIG.1**



**FAILSAFE REMOTE DATA CONCENTRATOR**

## BACKGROUND OF THE INVENTION

This application relates to a remote data concentrator, wherein data supplied by a plurality of sensors is sent through parallel paths such that one failed component in a concentrator will not cause the loss of information from any sensor.

Sensors, and in particular in aircraft, may sense the position of a switch, temperature, pressure, proximity, etc. Such sensors are located throughout an aircraft.

In the past, hard wiring has been used to connect each of these sensors to various controllers, or to the flight deck. Of course, this resulted in large amounts of wire.

Recently, aircraft have been provided with remote data concentrators (RDCs) to be mounted throughout the aircraft to collect the sensor data. A serial communication bus is used to route the information from the RDCs to downstream equipment.

Some of these RDCs have failure modes that could result in the loss of a large quantity of input data. This may lead to loss of a control function, which is undesirable.

## SUMMARY OF THE INVENTION

In a disclosed embodiment of this invention, signals either going to or from an RDC are provided along redundant streams such that the loss of some of the two streams will not mean all sensor information will be lost. In a disclosed embodiment, the RDC includes plural digital signal processing controllers.

These and other features of the present invention can be best understood from the following specification and drawings, the following of which is a brief description.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view showing an aircraft including a plurality of sensors.

FIG. 2 is a schematic view of a remote data concentrator for the aircraft of FIG. 1.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

An aircraft **10** is illustrated in FIG. 1. A plurality of sensors **S** each communicate through an RDC with the aircraft. The RDCs may communicate forwardly to the flight deck **11** or other controller.

One RDC **20** is illustrated in FIG. 2. As shown, a plurality of sensors **22**, **24**, **26**, and **28** communicate downstream through filters **30**. As can be appreciated, downstream of each of the filters **30**, each of the sensor signals are split between lines **31** and **33**. Thus, each of the two signals pass through a distinct input conditioning box **32**, and travel to two signal processing controllers **36**. Thus, should any one of the signal processing controllers **36** fail, the sensor information will not be lost. Downstream of the signal processing controllers is a box **38** which provides output processing of signals, and includes ground/opening signals **40**, and output conditioning **42**, along with filters **44**. This portion of the RDC **20** is as known in the art.

In addition, a pair of lines **50** & **52** are connected at **48** & **46** to each of the signal processing controllers **36**, and moves downstream to a module control interface **54**. Thus, should either of the lines **50** or **52** fail, the overall signal will still pass to an appropriate controller.

In sum, information from a sensor leading to a signal processing controller is split such that failure of any one signal processing controller will not cause loss of sensor information. Similarly, the information downstream of the signal processing controller is split between two lines such that the loss of either line will not cause loss of all sensor information.

Although an embodiment of this invention has been disclosed, a worker of ordinary skill in this art would recognize that certain modifications would come within the scope of this invention. For that reason, the following claims should be studied to determine the true scope and content of this invention.

What is claimed is:

1. A remote data concentrator system comprising:
  - a plurality of sensors to be utilized on an aircraft, each of said plurality of sensors delivering sensor signals downstream through at least two signal streams;
  - a plurality of signal processing controllers having their sensor signals split to be delivered to at least two of said signal processing controllers; and
  - signals passing downstream from said signal processing controller to a module control interface, and a signal being sent from said module control interface being split between two lines to provide redundancy.
2. The remote data concentrator system as set forth in claim 1, wherein said sensors are provided in pairs, and each of said sensors within a pair communicate with the same two signal processing controllers.
3. A remote data concentrator system comprising:
  - a plurality of sensors to be utilized on an aircraft, each of said plurality of sensors delivering sensor signals downstream through at least two signal streams;
  - a plurality of signal processing controllers having their sensor signals split to be delivered to at least two of said signal processing controllers; and
  - said sensor signals pass through a filter, and then are split before passing into input conditioning, and then being delivered to said signal processing controllers.
4. The remote data concentrator system as set forth in claim 3, wherein signals pass downstream from said signal processing controller to a module control interface, and a signal being sent from said module control interface being split between two lines to provide redundancy.
5. An aircraft electrical control system comprising:
  - a plurality of sensors, said plurality of sensors communicating with a common remote data concentrator;
  - a plurality of signal processing controllers in said remote data concentrator, said plurality of sensors having their signals split to be delivered to at least two of said signal processing controllers;
  - said sensors being provided in pairs, and each said sensor within a pair communicating with the same two signal processing controllers;
  - signals passing downstream from said signal processing controllers to a module control interface; and
  - a signal from said module control interface being split between two lines to provide redundancy.
6. An aircraft electrical control system comprising:
  - a plurality of sensors utilized on an aircraft, each of said plurality of sensors delivering sensor signals downstream;
  - a plurality of signal processing controllers, and each of said plurality of sensors having their sensor signals split to be delivered to at least two of said signal processing controllers; and

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signals pass downstream from said signal processing controllers to a module control interface, and a signal being sent from said module control interface being split between two lines to provide redundancy.

7. The system as set forth in claim 6, wherein said plurality of sensors are provided in pairs, and each of said sensors within a pair communicate with the same two signal processing controllers.

8. An aircraft electrical control system comprising:  
a plurality of sensors utilized on an aircraft, each of said plurality of sensors delivering sensor signals downstream;

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a plurality of signal processing controllers, and each of said plurality of sensors having their sensor signals split to be delivered to at least two of said signal processing controllers; and

5 said sensor signals pass through a filter, and then are split before passing into input conditioning, and then being delivered to said signal processing controllers.

9. The system as set forth in claim 8, wherein signals pass downstream from said signal processing controllers to a module control interface, and a signal being sent from said module control interface being split between two lines to provide redundancy.

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